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# A STUDY ON THE COLOUR FASTNESS PROPERTIES OF BLOCK PRINTED JUTE-COTTON FABRIC

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## ABSTRACT

Colours which contribute so much of the beauty of nature are essential to most products used by the modern society. Colour is one of the elements of nature that made human life more aesthetic and fascinating in the world. Scientist wants to find out the color difference in cotton fabrics through synthetic methods. They used different color combination in cotton fabrics through synthetic dyes using block printing techniques. Textile printing is the process of applying colour to fabric in definite patterns or designs. In properly printed fabrics the colour is bonded with the fiber, so as to resist washing and friction.

**KEY WORDS:** Colours give attraction to eyes by using block printing methods.

## INTRODUCTION

The art of printing fabrics is thousand of years old. It s not known exactly when the first fabric was given this surface decoration. Remains of printed fabrics have been found in both India and china that have been identified and as belonging to the period around 500 B.C (Gale ,1968)

Block printing is a type of direct printing. Here the design is created on plain white or coloured background fabrics by the use of blocks. These blocks have designs that are specially caved on it in such a way that only raised position of the block takes up the dye and this is pressed on the fabrics, the design is transferred on to it. Block printing can be done by hand or mechanically. In India, hand block printing is popular. There are many different types of synthetic dyes used for block printing technique. It is made with orgin , chemical composition, nature of reaction in order to produce colour (Degruy, et.al.,1973).

From ancient times, cotton has occupied a unique and privileged position. It is most ancient fibre used in textile industry. Cotton which has grown and used in India for more than 4000 years. (Gulati,1957). The materials to be printed may be cotton, wool ,silk ,jute ,rayon or any synthetic fiber or its blend. It s propably the cheapeast method of ornamenting textile materials. An important feture of printing is that it enables the printer to cover the fabrics defects to as far greater extend than what finishing could do ( Carter and Dakkal ,1991) .

Textile industry uses many different kinds of fibers as it raw material. Cotton which have been grown and used in India, for more than 4000 years has undisputed supremacy among fabrics for its versality and useful properties. Textile printing has evolved itself over the course of the last century in a very schematic and scientific way. This evolution has aimed at developing new dye stuff and simplifying methods of applications , the yielding prints having a fastness of high standard (chaya,1968).

The use of cotton as an important textile material , is not only due to its cheapness and abundance but also because of its hard wearing qualities which make it ideal for every day use. Various studies have been conducted on printing in woven fabrics using synthetic dyes. (Gooch, 1974) But so far , not many studies have been conducted on synthetic dyes using cotton fabrics. Hence an attempt has been made to print cotton fabrics with synthetic dye of pigment, direct and reactive to provide useful information. We can summarized the design in its broadest aspects all phases of our lives today (Johnston and Kaufman ,1967).

## OBJECTIVES

1. To compare the efficiency of three synthetic dyes namely direct, pigment and reactive using block printing on jute –cotton fabrics.
2. To study the colour fastness properties of the block printed samples by subjecting them to pressing, crocking and sunlight.

## METHODOLOGY

The main purpose of the study is to compare the sample of cotton fabrics in block printing with respect to laundering , sunlight , pressing (dry and wet), perspiration 9 acid and alkaline ) and crocking (wet and dry) .

## SELECTION OF DYES

Synthetic dyes such as pigment , direct and reactive .Binder as thickening agent were selected for printing (Miller , 1973).

### PIGMENT DYE :

Cotton fabrics should be printed with direct colour by steaming method.
1) Colour dye stuff – 8gm
2) Urea -5gm
3) Water -15gm
4) Tsp – 2g
5)Gum Arabic – 70 gm

### PROCEDURE FOR PREPARING STOCK BINDER PASTE:

Mix urea in water. Binder SLN mixes shallow vessels (beat) in machine . Pour Turpentine to binder SLN while it is slow and add to make it constant speed . 1kg of paste is prepared after mix then gum paste is added and stir it well . Finally add TSP mix all and do padding.

### DIRECT DYES:

Cotton fabrics should be printed with direct colour by steaming method.
1) Dyes -8gm
2) Urea-5gms
3) Water-15ml
4) Tsp-2gm
5) Gum Arabic -70gm

### PREPARATION OF DIRECT DYE:

First colour dye stuff should be wt in physical balanced . Then add some water ( double) .On the stove heat the water for some times and pour to the direct colour and stirred well . Heating should be accurate. Add urea 5gm, & stirred well and heat lightly. After cooling add Arabic gum. weight Arabic gum stir it well . Finally add TSP . Mix all and do padding .

### REACTIVE DYES :

cotton fabrics should be printed with reactive colour by block printing technique.
1) Dye stuff -5gm
2) Water – 17gm
3) Urea – 5gm
4) Yellow gum- 35gm ( gaur gum)
5) Pigment paste -35
6) Resist salt – 1gm (mild oxidizing )
7) Sodium bi carbonate–2gms

### PREPARATION OF REACTIVE DYE :

Add dye stuff put in balance and weight .Pour dyes in vessels .Add water and urea. Stir it well with the with the help of stir rod. Add gum paste after cooling then add pigment paste , resist salt . Finally add sodium bi carbonate for thickness. Then finally prepare padding.

### TEST FOR COLOUR FASTNESS PROPERTIES

Colour fastness test was carried out in printed samples to find out which synthetic dye show best result. The colour fastness test carried out was as follows:

1) Crocking –Dry and Wet crocking
2) Perspiration-Acid and Alkaline perspiration
3) Sunlight.
An original printed sample was kept aside for the purpose of evaluation.

**PREPARATION OF TEST SPECIMEN**
To compare the color fastness of the block printed fabric , the specimen were cut from printed sample as well as original white fabric .Each test specimen was labeled for easy identification .

The sizes of the test specimen were determined based on the requirement by specific machine used for testing. The specimen for laboratory test are crocking, laundering , perspiration, pressing ,sunlight, washing. In test where drying was necessary it was carried in laboratory at room temperature.

**COLOR FASTNESS TO CROCKING**
The test was done to determine the resistance of the specimen to rubbing. The samples subjected to crocking are given in Appendix-X and XI .

**DRY CROCKING**
The crocking test was done using rectangular testing device called crock meter. It is made of wood and measured four inches in length. The test specimen was fixed firmly in surface using clamp screw .A dry piece of white cloth measuring 2 inches was mounted at the end of testing device.

The test specimen was subjected to crocking by moving the white test piece on wooden block to and fro 10 times in 10 second. Care was taken to apply pressure evenly.

**WET CROCKING**
A white piece of cotton fabrics was immersed in distilled water and then experiment was carred out in the same manner as that of dry crocking.

**COLOUR FASTNESS TO PERSPIRATION**
The test was conducted to find out the colour fastness. The sample subjected to perspiration is given in Appendix –XII and XIII.

**ACID PERSPIRATION**
1) Sodium Chloride -10GRAMS
2) Sodium phosphate (DI Base)- 1GRAM
3) Lactic acid -1 GRAM

These 3 ingredients were added to 1000 cubic centimeter of distilled water. The tet sample was thoroughly immersed in this acid solution , rolled with the printed white cloth on the outside and inserted into a glass tube , leaving one third of the roll projecting outside . These tubes were placed at the temperature of 37 ℃ +2 for 6 hours . The test sample were then dried in air .

**ALKALINE PERSPIRATION**
1) Sodium Chloride - 10 GRAMS
2) Sodium phosphate (DI Base)-1 GRAMS
3) Ammonium Carbonate -4GRAMS

These 3 ingredients were mixed in 1000cc of distilled water and stirred to form a solution .The procedure is same as acid perspiration.

**COLOR FASTNESS TO SUNLIGHT**
Each of the test specimen measuring 4inches were fixed on the white cardboard & frame with the plane glass to protect the sample from dirt. The frame was kept 45°C to the vertical in an open air. It is kept in bright sunlight (plate -III).After exposures to sunlight for 20hrs these specimen were compared to the original sample for color fading.

The piece of the samples subjected to colour fastness to sunlight test are given in Appendix –XI.

**STATISTICALANALYSIS**
The result obtained was subjected to statistical analysis. The analysis was done by using Analysis of Variance (ANOVA) OR F- test at 95% level of significance, 99%level of significance and 99.9% level of significance.

**TEST OF SIGNIFICANCE**
The analysis was done by using ANOVA test. The Formula employed for the calculation of ANOVA test is as follows.

**ANALYSIS OF VARIENCE**
F-test = $\frac{\text{Between coloumn varience}}{\text{Within coloumn varience}}$

Symbolically , $F = \frac{S_1^2}{S2}$

**RESULTS & DISCUSSION**

**TABLE-I**
**COLOUR FASTNESS TO CROCKING**

| Printed test samples | Dry crocking | | Wet crocking | |
|---|---|---|---|---|
| | Colour transference | | Colour transference | |
| | Mean | S.D | Mean | S.D |
| Pigment dye | 2.20 | 0.45 | 2.00 | .71 |
| Direct dye | 3.80 | 0.45 | 3.60 | .55 |
| Reactive dye | 3.60 | 0.55 | 2.20 | .45 |

**TABLE-I (A)**
**TEST OF SIGNIFICANCE FOR COLOUR FASTNESS TO CROCKING**

| Printed test samples | Dry crocking | | | wet crocking | | |
|---|---|---|---|---|---|---|
| | Colour transference | | | Colour transference | | |
| | 'F' value | 'P' value | Sig | 'F' value | P' value | Sig. |
| Pigment dye Direct dye reactive dye | 16.286 | .000 | 99.9% | 11.400 | .002 | 99% |

**TABLE-II**
**COLOUR FASTNESS TO PERSPIRATION**

| Printed test samples | Acid perspiration | | | | Alkaline perspiration | | | |
|---|---|---|---|---|---|---|---|---|
| | Colour change | | Colour transference | | Colour change | | Colour transference | |
| | Mean | S.D | mean | S.D | Mean | S.D | Mean | S.D |
| Pigment dye | 3.80 | 0.84 | 3.20 | 0.45 | 4.00 | 0.71 | 2.40 | .55 |
| Direct dye | 3.00 | 0.71 | 3.80 | 0.45 | 2.60 | 0.55 | 3.80 | .45 |
| Reactive dye | 3.40 | 0.55 | 3.80 | 0.45 | 3.60 | 0.55 | 3.80 | .45 |

**TABLE-II (A)**
**TEST OF SIGNIFICANCE FOR COLOUR FASTNESS TO PERSPIRATION**

| Printed test sample | Acid pressing | | | | | | Alkaline pressing | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Colour change | | | Colour transference | | | Colour change | | | Colour transference | | |
| | 'F' Value | 'P' Value | Sig | 'F' Value | 'P' Value | Sig | 'F' Value | 'P' Value | Sig | 'F' Value | 'P' Value | Sig |
| Pigment dye Direct dye Reactive dye | 1.600 | .242 | NS | 3.000 | .088 | NS | 7.091 | .009 | 99% | 14.000 | .001 | 9.99 % |

**TABLE III**
**COLOUR FASTNESS TO SUNLIGHT**

| Printed test samples | Sunlight | |
|---|---|---|
| | Mean | S.D |
| Pigment dye | 1.40 | .55 |
| Direct dye | 3.00 | 1.00 |
| Reactive dye | 1.60 | .55 |

*SD – Standard Deviation*

**GUIDE FOR RATING**

5 Excellent – negligible rate of colour change or colour transference

4 Very good – very little rate of colour change or colour transference

3 Good – little rate of colour change or colour transference

2 Fair – appreciable rate of colour change or colour transference

1 Poor – objectionable rate of colour change or colour transference.

**TABLE-III (A)**
**COLOUR FASTNESS TO SUNLIGHT**

| Printed test samples | Sunlight | | |
|---|---|---|---|
| | 'F' Value | 'P' Value | Sig |
| Pigment dye<br>Direct dye<br>Reactive dye | 7.125 | .009 | 99% |

*Sig – level of significance*

**CONCLUSION**

This research project was undertaken with a view to study to effect of synthetic colours used for block printing on cotton fabrics. The sample of the fabric printed with the dyes of three different synthetic dyes are pigment, direct, reactive were usually inspected and rated by panel of judges. Laboratory test were conducted to analyze the colour fastness of the selected three synthetic dyes used as block printing in cotton fabrics.

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